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STATE OF ALASKA

William A. Egan, Governor

Alaska Department of Fish and Game

Walter Kirkness, Commissioner

Sport Fish Division

Alex H. McRea, Director

ANNUAL REPORT OF PROGRESS, 1961-1962

FEDERAL AID IN FISH RESTORATION PROJECT F-5-R-3

SPORT FISH INVESTIGATIONS OF ALASKA

Richard Haley, Coordinator, Juneau
Robert Baade, Fishery Biologist, Ketchikan
Roger Wadman, Fishery Biologist, Wrangell
Jeremy Sexsmith, Fishery Biologist, Kodiak
Sidney Logan, Fishery Biologist, Seward
Frank Stefanich, Fishery Biologist, Anchorage
Edward J. Cramer, Fishery Biologist, Anchorage
Rupert E. Andrews, Fishery Biologist, Palmer
George Van Wyhe, Fishery Biologist, Glennallen
Henry J. McKirdy, Fishery Biologist, Fairbanks

INTRODUCTION

This report of progress consists of the job completion reports from the State of Alaska Federal Aid in Fish Restoration Project F-5-R-3, "Sport Fish Investigations of Alaska."

The current project is composed of twenty separate studies and was designed to evaluate the various aspects of the State's recreational fishery resources. The information gathered will provide the necessary background data for better management practices and for the development of future studies. During the current segment, continued emphasis was placed on the overall inventory and cataloging of accessible waters, evaluation of catch data, and investigations on various species of fish.

As a result of several problems of immediate concern, several new studies were instigated during the report year. Data accumulated from these studies has helped solve some problems in projects already in progress.

The population of Alaska is increasing rapidly and this is being reflected in the ever increasing number of "No Trespassing" signs put up by individuals in the vicinity of population centers. Fortunately, much of Alaska's fishery waters are still in the public domain. The division's program of acquiring access to fishing waters continued at a much faster pace since being instigated in 1959. Emphasis is being placed on this job and the successful continuation of this activity will forstall many serious recreational use problems currently facing other states.

The enclosed progress reports are fragmentary in many respects and the interpretations contained therein are subject to re-evaluation as the work progresses.

JOB COMPLETION REPORT

RESEARCH PROJECT SEGMENT

State: ALASKA

Project No: F-5-R-3 Name: Sport Fish Investigations of Alaska

Job No: 11-A Title: Inventory and Cataloging of Sport Fish and Sport Fish Waters of the Copper River and Prince William Sound Drainages.

Period Covered: May 15, 1961 to April 30, 1962

Abstract:

The inventory and cataloging activities were conducted primarily in the Upper Copper River Drainage System. A total of 17 lakes and 16 streams were surveyed. Prince William Sound drainages received no survey work during this period. Standard survey techniques were utilized, including experimental gill netting, to determine the resident and anadromous fishes present.

An experimental grayling egg take was undertaken in June of 1961. Approximately 300,000 eggs were taken.

Aerial surveys were conducted to obtain information on salmon spawning areas and timing of salmon runs.

Eleven lakes were netted to evaluate the success of hatchery plants and to obtain fish population data.

The waters surveyed and the results of test netting are tabulated in this report. Complete survey information on each body of water is available at the Glennallen field office or the Department office in Juneau.

Recommendations:

Based on available data it is recommended that:

1. The grayling egg take experiment be continued to gather more information on sex composition of the spawning migration and additional information on spawning behavior.

2. Experimental stocking of rainbow trout and silver salmon be continued in roadside lakes to obtain information on factors influencing the survival of hatchery fish and to determine the best stocking rates.

3. The inventory and cataloging program be continued with emphasis on waters adjacent to the Cordova road system and the Denali Highway.

4. A creel census program be initiated on the sport fishery in Valdez Arm of Prince William Sound.

5. A project be set up to collect information on the life history of the lake trout.

Objectives:

To evaluate the extent, the potential and the current use of waters available to the area's anglers.

To investigate the sources for providing a supply of trout, char, salmon and grayling eggs for experimental hatching and rearing.

To investigate the feasibility of, and formulate plans for experimental rehabilitation.

To determine the relative need for future management investigations and to direct the course of such studies.

To provide recommendations for management practices.

Techniques Used:

Standard survey methods were employed to collect physical data, which included such characteristics as depth, barriers

and bottom types of the lakes and tributary streams. Graduated mesh gill nets were used to determine the fishes present and to collect age and growth data.

Lakes were assessed for their potential sport fish value. Recreation and public use sites were noted and the information was forwarded to the access biologist for processing.

Some lakes, creeks, and rivers not adjacent to the road system were surveyed by float plane or back-pack trip to evaluate their potential.

Indian fishwheels along the Copper River were repeatedly contacted for information concerning species composition in the different tributaries, time and intensity of runs, and to substantiate the records kept by the operators of the fishwheels.

Aerial counts of salmon were made on major salmon spawning areas to obtain data on the size and timing of salmon runs.

Sixteen major salmon spawning streams were surveyed to establish the amount of spawning gravel, existence of barriers and water flow.

Findings:

Experimental Grayling Egg Take

Increased demand for grayling in other areas of the State, and the adaptability of this fish to waters unsuitable for trout, prompted the experimental grayling egg take. The main objectives were to gather data on the possibility of obtaining eggs for hatchery propagation and to obtain information on egg handling and hatching requirements The capacity of Fire Lake Hatchery for grayling eggs limited this experiment to approximately 300,000 eggs.

In selecting areas for taking grayling spawn, preference was given to waters not heavily utilized by sport fishermen. Difficulty was experienced in the selection of remote areas because the spawning migration occurs simultaniously with spring break-up. This fact eliminates all fly-in lakes because ice conditions prohibit the use of either float or ski equipped planes. Waters accessible

by automobile were chosen.

On May 18, a temporary weir was constructed on Bear Creek at Mile 127 on the Richardson Highway. This weir trapped 191 grayling. Holding pens were constructed for 32 females and 19 males. The remaining 140 fish were placed above the weir to spawn. Water temperatures at the weir site ranged from 37°F to 39°F during the spawning migration. Active spawning occurred when the water temperature was between 40°F and 43°F. Mature female fish ranged in length from 11.5 inches to 13.2 inches, with an average of 12 inches. On the 23rd day of May, 72,000 eggs were taken; an average of 2,180 per female.

On May 25, a temporary weir was constructed on Mud Creek, a tributary of the Gulkana River. Maximum-minimum temperatures were taken and observations of grayling spawning activities were made (Table 1). The movement of the fish seemed to be dependent on water temperatures. Spawning activities appeared to be correlated with both water temperatures and the amount of sunlight. Greatest spawning activity was observed when water temperatures were between 40°F and 43°F and in the absence of bright sunlight.

On June 1, 1961, a downstream migration of spawners from Mud Lake was noted. To supplement fish taken in the weir, a monofilament gillnet with 1 1/2 inche mesh was stretched across the creek at a point where the water was two feet deep. The gillnet was checked every 15 minutes and the fish were removed under water. Fish captured in this manner were held in separate pens with less than a one per-cent mortality.

Grayling from Mud Lake were larger than those taken in Bear Creek. Total length of the females used for spawning ranged from 14.5 to 17.4 inches with an average of 16.1 inches. Males ranged from 14.7 to 19.0 inches. A total of 230,000 eggs was taken from 60 spawners, representing approximately 3,800 eggs per female. This figure is not indicative of the number of eggs produced by fish of this size because a deliberate effort was made to avoid complete stripping of the females.

The Mud Creek egg taking site is approximately 260 miles from Fire Lake Hatchery. This distance made it mandatory that a sufficient number of females be ripe at a

Table No. 1 - Mud Creek Weir Data

DATE	GRAYLING CAPTURED				WATER TEMPERATURE	
	Weir		Gill Net		Max.	Min.
	Male	Female	Male	Female		
5/26/61	3				39	36
5/27/61	0				38	36
5/28/61	3				40	38
5/29/61	13				43	39
5/30/61	6				41	38
5/31/61	46	6			43	41
6/1/61	52	14	123	51	44	40
6/2/61	131	35	131	47	43	40
6/3/61	64	14	63	14	43	40
TOTAL	318	69	317	112		

given time to make the operation economically feasible. Difficulty was experienced in obtaining a suitable number of females in the same degree of maturity. To overcome this, the grayling were loaded into an oxygen equipped, non-insulated tank truck. A total of 70 females was placed in one compartment and 131 males in the other. The fish were then taken to the Glennallen headquarters and the oxygen equipment placed in operation. In an attempt to avoid pseudo-spawning by any appreciable number of females, the truck was parked in direct sunlight with the covers removed. During the night two 300 watt light bulbs were suspended over the tanks. The water temperature was maintained between 55 and 60 degrees for a period of 14 hours. At the end of this period all the females were ready to be spawned.

All eggs taken in this experiment were stripped into pans and fertilized by the wet method. The procedure was to place about 1/4 inch of water in a 12 inch dish pan. Milt was stripped into the water immediately preceding the stripping of a female. Two males were used for every female. As soon as the desired amount of eggs was obtained in the pan, they were stirred slightly with a feather and allowed to stand for 15 minutes before being transferred to a larger pan for hardening. The eggs were allowed to harden for a period of 1 1/2 hours. During this time they were stirred with a feather to prevent adhesive clustering.

For transportation, two quarts of eggs were placed in a one gallon jar and the jar completely filled with water to reduce agitation. The jars were placed in plastic bags with crushed ice to keep the water temperatures low. The eggs were flown 180 miles to Fire Lake Hatchery and placed in Downing type hatching jars. Elapsed time between the taking of the eggs and placement in the hatching jars was seven hours.

Five days after the eggs were placed in the hatchery, egg mortality totaled 80. This indicates a very high rate of fertilization and success in egg handling.

Observations of the spawning activities indicated that water temperatures exhibit the greatest influence on the movement of fish to the spawning grounds. Greatest movement to the spawning area was noted when temperatures remained above 39°F.

Spawning activities were confined to moderately flowing water less than 15 inches in depth. Spawning beds consisted of gravel and small rocks less than two inches in diameter. Height of the spawning activity was noted between the hours of 8 p.m. and 2 a.m. when the spawning beds were not exposed to direct sunlight and water temperatures were above 40°F. No spawning activities were observed during bright sunny days. On rainy, overcast days, limited spawning activity was observed, apparently in correlation with the amount of light. During the daylight periods of bright sunlight, the fish would lay in holes five to ten feet deep. At this time they could be readily taken on spinning gear. During a two hour fishing period, 72 grayling were taken on a spoon. Of the fish taken by this method, 68 were males and four were females. The high percentage of males caught is attributed to their aggressiveness while on or near the spawning beds. During the period of peak spawning activity, the fish were not seen feeding, nor was any indication of feeding noted in stomachs examined during this period.

Under natural conditions, 172 pairs of grayling were observed spawning. In all instances the spawning act consisted of a female moving to the selected spawning area followed by several males. After several seconds of buffeting and jockying by the males for position, one would aligh himself parallel to the female. In 90% of the observations, the male was on the right side of the female.

When the male and female were adjacent to each other, both would partially turn on their sides with the male slightly upstream from the female. In this position, the large dorsal fin of the male would be over and slightly forward of the corresponding dorsal fin and the influence of the cupped dorsal fins, which created a resistance to the water current, pushed the tail of the female into the gravel to a point adjacent to the vent. This act varied in time from two seconds to seven seconds after which both fish left the area. Examination of the area proved the eggs to have been deposited approximately one inch below the surface of the gravel. Observation of two females marked with bright plastic strips indicate that this process is repeated at least four times. Following this partial spawning act, the female retreats to deeper water to rest while the male continues to search out other females.

Table No. 2 Test Netting Summaries, 1961.

NAME	NUMBER OF FISH	SPECIES	LENGTH RANGE	LENGTH MEAN	FREQUENCY 1/	COMPOSITION %
Caribou Lake		No Fish Taken				
Carlson Lake	173	GR.	6.8 - 14.5	10.6	5.58	99
	1	DV.	7.5		.03	1
Copper Lake	58	LT.	9.0 - 34.0	19.6	.016	25
	72	GR.	8.0 - 18.0	13.5	.019	30
	94	WF.				40
	9	RS.	17.0 - 28.0	25.0	.025	3.8
	1	SS.	14.0		.0028	.42
	1	DV.	13.0		.0028	.42
Crater Lake		No Fish Taken				
Cresent Lake		No Fish Taken				
Crystal Lake	11	RB.	8.8		11	100
Dick Lake		No Fish Taken				

1/ No. of fish per hour in 125' Exp. Gill Net.
GR. - Grayling; LT. - Lake Trout; WF. - Whitefish; DV. - Dolly Varden;
RS. - Red Salmon; SS. - Silver Salmon

Table 2 Test Netting Summaries, 1961. (continued)

NAME	NUMBER OF FISH	SPECIES	LENGTH RANGE	LENGTH MEAN	FREQUENCY 1/	COMPOSITION %
Dickey Lake	45	GR.	7.4 - 15.0	16.5	.98	63
	21	WF.	10.9 - 18.0	13.3	.45	30
	5	LT.	10.8 - 18.5	1.01	.10	7
Gillispie Lake	88	GR.	6.8 - 14.7	11.8	2.4	89
	11	Suckers	6.0 - 19.0	14.6	.29	10
	2	WF.	9.3 - 16.8	13	.08	1
Goat Lake	47	GR.	10 - 16	14	1.9	100
June Lake	6	GR.	8.1 - 11.2	9.65	.17	9
	23	Suckers	6.0 - 17.5	11	.38	37
	2	Ling Cod	9.8 - 12.6	11.2	.03	3
	31	WF.	.70- 17.6	10.7	.32	51
Mankomen Lake	11	LT.	17.0 - 22.0	18.8	.31	81.4
	48	WF.	10.5 - 16.0	13.3	1.37	18.6
Moore Lake	2	RB.	5.9 - 8.2	7.0	.0487	100
Mud Lake	5	GR.	10.0 - 13.4	11.7	.15	20
	20	WF.	8.4 - 17.4	13.5	.62	80
Nita Lake	25	WF.	8.7 - 14.0	11.3	.27	51
	23	Suckers	7.4 - 21.0	14.2	.25	47
	1	Ling Cod	8.0	8.0	.01	1

Table 2 Test Netting Summaries, 1961. (continued)

NAME	NUMBER OF FISH	SPECIES	LENGTH RANGE	LENGTH MEAN	FREQUENCY 1/	COMPOSITION %
St. Anne Lake	20	Suckers	7.5 - 20.0	15.7	.51	15
	110	WF.	8.0 - 15.0	12.8	2.82	82
	1	Ling Cod	15.0	15.0	.25	.75
	2	DV.	8.0 - 9.0	8.5	.52	
Summit Lake	16	RB.	7.5 - 16.2	11.7	.76	100
Wyoming	6	GR.	8.1 - 11.2	9.6	.25	32
	13	WF.	7 - 17.6	10.7	.54	68
Blueberry Lake	6	RB.	6.4 - 11.2	8.63	.16	100
Dakota Lake	12	GR.	5.0 - 8.5	6.3	.44	34
	21	RB.	6.8 - 9.0	7.8	.77	58
	3	SS.	6.9		.11	8
Gergie Lake	55	Gr.	7.0 - 16.0	14.0	.96	49.5
	54	Suckers	8.7 - 19.6	17.0	.94	48.6
	2	RB.	8.2 - 8.6	8.4	.35	1.9
Lee's Lake	62	Gr.	5.9 - 15.4	9.6	.7	36
	112	Suckers	5.9 - 17.5		1.27	64
One Mile Lake	68	GR.	7.3 - 7.9	7.5	2.2	18
	293	Suckers	8.0 - 11.0	9.9	9.4	80
	4	DV.			.12	2

Table 2 Test Netting Summaries, 1961. (continued)

NAME	NUMBER OF FISH	SPECIES	LENGTH RANGE	LENGTH MEAN	FREQUENCY	COMPOSITION %
Moose Lake	131	GR.	5.9 - 16.0	9.8	1	77.4
	38	Suckers			.29	22
	1	DV.			.003	.6
Summit Lake # 2	9	RB.	6.9 - 11.5	8.75	1.92	100
Two Mile Lake	37	GR.	7.2 - 8.1	7.5	1.85	77
	11	RB.	5.9 - 8.2	7.0	.54	23
Town Lake	5	GR.	7.8 - 11.7	9.14	.13	12
	2	DV.	14.3 - 15.3	14.8	.05	5
	35	Suckers				

During the time the Mud Creek weir was in operation 154 round whitefish, Prosopium cylindraceum (Pallas), were captured. Another 30 or so whitefish were on and about the spawning beds. No serious egg depredation was noted, but these fish readily policed the area for any grayling eggs not deposited in the gravel.

Evaluation of stocked lakes

Test netting of stocked lakes revealed that, in all instances, populations were established and acceptable growth rates were obtained (Table 2).

Two barren lakes, Moore and Crystal, stocked in 1960, produced rainbows averaging 7.0 and 8.8 inches respectively.

In 1960, experimental plantings of rainbow or silver salmon were conducted in three lakes containing populations of other species.

Gergie Lake, with 60 surface acres, has an indigenous population of grayling and suckers. Gergie Lake was stocked with 8,725 rainbows at 727 per pound, representing 145 to the acre. In ten months, they had attained an average length of 8.4 inches.

Two small lakes on the Chitina Road, containing indigenous grayling populations, were stocked in 1960. Two Mile Lake was stocked with 1,000 rainbow trout at approximately 700 to the pound. This represented 60 trout to the surface acre in this 17 acre lake. Fish taken eleven months later averaged 7.0 inches in length. Dakota Lake was stocked with 6,800 rainbows and 1,000 silver salmon. The rainbow were 700 per pound, while the silvers were 550 per pound. This was 340 rainbow trout and 50 silver salmon per surface acre. Test netting eleven months later revealed that the rainbows had reached an average length of 7.8 inches and the silvers were averaging 6.9 inches.

An experimental stocking of grayling fry was undertaken to obtain information on the potential use of hatchery fry of this species. Three barren lakes were selected for limnological characteristics representative of other waters in the area. These lakes, Dick, Pippin and Mission were stocked during the month of June with fry from Fire Lake Hatchery.

Table 3. Streams Surveyed Under Project F-5-R-3.
Job No. 11-A.

Name	Length Miles	USGS 1:250,000 quad that Stream Heads In
Bad Crossing No. 1	10	Gulkana
Bad Crossing No. 2	8	Gulkana
Copper Creek	8	Nabesna
East Fork of Chistochina R.	25	Gulkana
Fish Creek (Mentasta)	4	Nabesna
Fish Creek (Paxson)	8	Mt. Hayes
Goat Creek	5	Nabesna
Gunn Creek	3	Mt. Hayes
Lakina River	20	McCarthy
Lower Kaina Creek	8	Valdez
Mahlo Creek	2	Valdez
Middle Fork (Gulkana R.)	26	Gulkana
Mud Creek	3	Mt. Hayes
St. Anne Creek	10	Valdez
Swede Creek	6	Gulkana
Tannada Creek	35	Nabesna

Table 4 Lakes Surveyed Under Project No. F-5-R-3.
Job No. 11-A.

NAME	LOCATION	LEGAL DESCRIPTION Long.	Lat.
Carlson Lake	Mile 68	144° 40"	62° 41"
Caribou Lake	Mile 13, Denali Hwy.	145° 48"	63° 5"
Copper Lake	Nabesna Road (Fly-In)	Nabesna Quad Unsurveyed	
Crater Lake	Denali Hwy. (Fly-In)	146° 50"	62° 7"
Cresent Lake	Mile 195 Richardson Hwy.	145° 29"	63° 7"
Crystal Lake	Fielding Lake Road	145° 43"	63°
Dick Lake	Mile 173 Richardson Hwy.	145° 28½"	62° 52"
Dickey Lake	Denali Hwy. (Fly-In)	146° 10"	62° 45"
Gillispie Lake	Mile 167½ Richardson Hwy.	145° 29"	63° 8"
Goat Lake	Nabesna Road (Fly-In)	Nabesna Quad Unsurveyed	
June Lake	Mile 166.5 Ri	145° 28"	62° 46"
Mankomen Lake	Richardson Hwy. (Fly-In)	144° 32"	63° 00"
Moore Lake	Mile 197 Richardson Hwy.	145° 29"	63° 8"
Mud Lake	Mile 1 Denali Hwy.	145° 31"	63° 13"
Nita Lake	Mile 166 Richardson Hwy.	145° 30"	62° 46"
St. Anne Lake	Glenn Hwy. (Fly-In)	146° 2"	61° 53"
Wyoming Lake	Mile 167 Richardson Hwy.	145° 28½"	62° 48½"

Table 5. Subsistence Fishing Upper Copper River 1961.

Species	Number Requested	Actual Number Taken (returns)	Calculated Number Taken (pro rated)	Average No. per/ permit
Red Salmon	40,520	14,977	24,075	75
King Salmon	5,753	393	632	1.97
Silver Salmon	1,598	367	591	1.84
Chums	0	131	212	.66
Pinks	0	123	199	.62
Total	47,871	15,991	25,709	80.09

Total Number of permits issued ---------- 321

Total Number of returns received ---------- 200 or 62%

Average Number of Salmon requested ---------- 149

Average Number of Salmon taken ---------- 80

Dick Lake contains 40 surface acres and has maximum depth of 32 feet. It was stocked with 25,000 fry representing 667 per surface acre.

Three acre Mission Lake was stocked with 2,000 grayling fry representing 667 to the acre.

Pippin Lake, with 160 acres and a depth of seven feet, was stocked with 15,000 grayling fry representing 94 to the surface acre.

Attempts to capture these fish later in the fall were unsuccessful, although they were observed feeding in the lakes prior to freez-up.

A total of 17 lakes and 16 streams were surveyed, and locations are shown in Tables 3 and 4.

Subsistence Fishery

The number of permits issued in the Glennallen office increased from 35 in 1960 to 321 in 1961. The total number of salmon taken increased from 7,182 to 25,709 in 1961 (Table 5). The average number of fish taken per permit dropped from 200 in 1960 to 80 in 1961. This reduction is due to the large number of permits issued to persons not living in the immediate area. The subsistence returns were forwarded to the Cordova office so timing of the catches is not included in this report.

Fish wheels accounted for the greatest number of salmon. Of the 15,991 salmon reported taken on subsistence permits, 14,388 were taken by fish wheels.

Salmon taken on subsistence permits are primarily intended for human consumption. Natives in Copper Center and Gulkana villages preserve their fish by drying, smoking and canning. Few salmon are utilized solely for dog food. The 12 dog teams in the area are dependent of salmon heads and back strips.

The Gulkana and Tonsina rivers are potentially important salmon sport fishing streams. The salmon and steelhead permit fisheries provide information vital to the management of these species.

Of the 282 permits issued, 173 requested dip nets. This indicates that the subsistence fishery is about 80% recreational as opposed to actual human subsistence needs.

Prepared by:

George Van Wyhe
Fishery Biologist

Approved by:

Richard Haley
D-J Coordinator

Alex H. McRea, Director
Sport Fish Division